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The Comparison of Analgesic Effects of Ketorolac with Tramadol–Ketorolac Combination in Patients with Post-Orthopedic Surgical Pain at Trauma Center of Dr. M. Djamil Padang Central General Hospital

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ABSTRACT: Post-operative pain is the most common problem felt by patients. As many as 80% of patients experience acute pain after a surgical procedure. Pain management is critical and is a matter of concern in post-surgical patients. This study aims to compare the analgesic effect of Ketorolac with the combination of Tramadol-Ketorolac in patients with post-orthopedic surgical pain at Trauma Center of Dr. M. Djamil Hospital Padang (From January until March, 2023). This study is retrospective with an analytical observational study design using a cross-sectional design and a time-limited sampling method. Pain scale assessment was carried out using visual analog scale (VAS) scores. The results showed that the population of 97 patients, samples that met the inclusion criteria were 52 patients. The group of Ketorolac was 18 patients, while the Tramadol-Ketorolak combination group was 34 patients. The analysis was conducted by *Mann-Whitney* Test. The statistical results of the pain level and length of stay (LOS) in the administration of the ketorolac with the tramadol-ketorolac combination showed there was no significant difference with sig. > 0.05. This study concludes that there is no significant difference in the analgesic effect of the Ketorolac with Tramadol-Ketorolac Combination based on the pain scale and LOS in patients with post-orthopedic surgical pain at Trauma Center of Dr. M. Djamil Padang Hospital.

KEYWORDS: Analgesic, Ketorolac, Tramadol, Acute Pain, Post-Operative, Orthopedic

I. INTRODUCTION

Post-surgical pain is the most common problem experienced by patients, as many as 80% of total patients experience acute pain after surgical procedures. Pain management is very important and continues to be a concern for post-surgical patients. One of the most frequently performed surgical procedures is orthopedic surgery (Windari et al., 2020). Orthopedic surgery causes moderate to severe pain in most patients.

Post-operative pain if not managed adequately can cause delays in patient recovery, increase hospital stay, morbidity, mortality and inhibit the healing process (Rini et al., 2016). Proper post-operative pain management with adequate analgesics will accelerate recovery and shorten the patient's hospital stay. Chronic pain occurs as a result of unresolved acute post-operative pain and causes decreased quality of life and increased health care costs (Windari et al., 2020).

The results of Basic Health Research by the Health Research and Development Agency in 2018, the prevalence of orthopedic surgery in Indonesia was caused by fractures of 5.5%. The prevalence of injuries according to body parts, the lower extremities have the highest prevalence of 67.9% (Riskesdas, 2018). According to research conducted by Santoso et al.(2016) stated that the prevalence of moderate pain within 24-48 hours after orthopedic surgery was 36.3%, of which 60.3% experienced pain due to surgical incisions (Santoso et al., 2016). According to research conducted by Ndebea et al (2020), the prevalence of post-operative pain in elective orthopedic surgery patients was reported to be 61% (4 hours post-surgery), 73% (24 hours after surgery), 67% (36 hours post-operative) and 58% (48 hours post-operative) (Ndebea et al., 2020).

Pharmacological therapy to overcome pain is analgesics. Analgesics are drugs used to reduce or eliminate pain without losing consciousness. However, it is better to give analgesics in pain

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management by assessing the degree of pain first, because considering the type and intensity of pain is important in assessing the effects of analgesics. The most widely used analgesics in post-fracture surgery pain management at RSUP DR. M. Djamil Padang are Ketorolac injection and Tramadol injection. The use of intravenous Tramadol is often combined to treat moderate to severe pain with NSAID analgesics, especially Ketorolac intravenous (Karmena et al., 2015).

II. EXPERIMENTATION

This type of research is an analytical observational study using a cross-sectional method. Data collection is retrospective from medical records of patients with post-operative orthopedic pain at Trauma Center of Dr. M. Djamil Padang General Hospital (January-March, 2023).

The location of this research was in the Medical Record Room of Dr. M. Djamil Padang General Hospital. The population in this study were all patients with post-orthopedic surgical pain in Trauma Center of Dr. M. Djamil Padang General Hospital in (January–March, 2023). The sample of this study was patients with post-orthopedic surgical pain who received Ketorolac therapy with a combination of Tramadol-Ketorolac at Trauma Center of Dr. M. Djamil Padang General Hospital who met the inclusion criteria using the time-limited sampling method.

III. RESULT AND DISCUSSION

Characteristics of patients with post-operative orthopedic pain based on gender found that orthopedic surgery was higher in male than female. From the 52 patients met inclusion, 30 patients or around 57.69% were male while women were 22 patients or around 42.31%. This is in line with research conducted at Harapan Sehat Hospital in 2022 which stated that orthopedic cases were higher in men as many as 25 patients (67.5%) this number is twice as much as women, namely 12 patients (32.5%) (Aulia et al., 2024).

Table I. Characteristics of Post-orthopedic surgery pain patients at Trauma Center of Dr. M. Djamil Padang General Hospital (Based on gender)

Gender	Number of Patients	Percentage (%)
Male	30	57.69
Female	22	42.31
Total	**52**	**100**

Characteristics of patients with post-orthopedic surgical pain based on ageit was found that the most orthopedic surgery occurred at the age of (46-65 years) as many as 19 patients or around 36.54% underwent orthopedic surgery. While the second most common age occurred at the age of (26-45 years), this is in accordance with research conducted by Fitriyani (2018), saying that the most orthopedic surgery in the 46-65 age group was 35 patients (41.18%) and the second most in the 26-45 age group (Fitriyani et al., 2018).

This is influenced by the increasing activity of patients. So that, there are often cases of fractures or dislocations caused by trauma experienced by patients. Orthopedic cases, especially the musculoskeletal system, are often experienced at the age of 18 to 30 years, and continue to worsen with age, especially around the age of 40 years. In addition, lower back pain and joint stiffness are often a source of suffering as we age (Aulia et al., 2024).

Table II. Characteristics of patients with post-orthopedic surgical pain at Trauma Center of Dr. M. Djamil Padang General Hospital (Based on age)

Age	Number of Patients	Percentage (%)
18-25	12	23.08
26-45	16	30.77
46-65	19	36.54
>65	5	9.62
Total	**52**	**100**

Distribution of patients based on type of orthopedic surgery at Dr. M. Djamil Padang General Hospital for the period January-March 2023Trauma/Fracture cases are the most cases, namely 42 patients (80.77%). This is in line with research conducted by Aulia et al (2024) which states that the most orthopedic cases are fracture cases, namely 23 patients (62.2%) (Aulia et al., 2024).

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Table III. Distribution of orthopedic patients at Trauma Center of Dr. M. Djamil Padang General Hospital (Based on Type of Orthopedic Surgery)

No.	Types of Orthopedic Surgery	Number of Patients	Percentage (%)
1	Trauma / Fracture	42	80.77
2	Bone/joint disease	4	7.69
3	Tumor / Metastasis	3	5.77
4	Osteomyelitis	2	3.85
5	Diabetic ulcer	1	1.92
	Total	**52**	**100**

Distribution of patients based on type of analgesic was obtained that the combination of Tramadol-Ketorolac was 34 patients (65.38%) while the use of Ketorolac was 18 patients (34.62%). These results are in line with research conducted by Suciati & Setiawari at Dr. Loekmono Hadi Kudus Regional Hospital, the most common use of analgesics in orthopedic surgery was the Tramadol-Ketorolac combination, namely 48 patients (47.52%) (Suciati & Setiawati, 2021). In this study, all patients received intravenous injection preparations, because this route of administration can provide the fastest effect. Post-orthopedic surgery patients need a fast effect in eliminating the pain they feel. This result is in line with research conducted by Suciati & Setiawan at Dr. Loekmono Hadi Kudus Hospital, namely that almost all (95.22%) orthopedic surgery patients received the intravenous injection route (Suciati & Setiawati, 2021).

Table IV. Distribution of patients patients with post-orthopedics surgical pain at Trauma Center of Dr. M. Djamil Padang General Hospital (based on the type of analgesic used)

Types of Analgesics	Number of Patients	Percentage (%)
Ketorolac injection 30mg/8 hours	18	34.62
Tramadol injection 100 mg/24 hours + Ketorolac injection 30 mg/8 hours	34	65.38
Total	**52**	**100%**

The distribution of patients based on the differences in the final pain scale in the administration of analgesic types can be seen in Table V. In this study, patients with post-orthopedic surgical pain at Dr. M. Djamil Padang General Hospital experienced moderate pain levels, namely pain scale of 4, 5 and 6, the standardized post-surgical pain level is expected to be obtained by patients with almost the same stimulus or pain level, so that the administration of Ketorolac with a combination of Tramadol-Ketorolac as an analgesic can be assessed in general by assessing post-surgical pain using a visual analogue scale (VAS) pain scale. This is in line with research conducted at the Sultan Agung Islamic Hospital, which states that in post-orthopedic surgery, the level of pain that many patients feel is before receiving a Ketorolac injection; the pain scale is 4-6, which is included in the moderate category, with the pain scale assessment using the numerical rating scale (NRS) (Timur & Widyaningrum, 2021).

Table V. Distribution of patients in administer of analgesics to patients with post-orthopedics at Trauma Center of Dr. M. Djamil Padang General Hospital (Based on pain scale)

Pain Scale	Ketorolac	Percentage (%)	Tramadol-Ketorolac	Percentage (%)
Pre-operative				
4	9	17.31%	11	21.15%
5	9	17.31%	10	19.23%
6	0	0%	13	25.00%
Total	**18**	**34.62%**	**34**	**65.38%**

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Post-operative				
2	11	21.15%	19	36.54%
3	7	13.46%	15	28.85%
Total	**18**	**34.61%**	**34**	**65.39%**

The distribution of patients based on length of stay (LOS) in the administration of analgesic types can be seen in Table VI. In this study, the Mann-Whitney test was conducted on LOS, and it was found that there was no significant difference between the LOS of single Ketorolac administration and the Tramadol-Ketorolac combination with a value of 0.845 (Sig.>0.05).

Table VI. Distribution of patients with post-orthopedic surgical pain at Trauma Center of Dr. M. Djamil Padang General Hospital (Based on Length of Stay)

***Length of Stay* (LoS)**	**Ketorolac (n)**	**Percentage (%)**	**Tramadol-Ketorolac Combination (n)**	**Percentage (%)**
1-3 days	8	17.31	4	7.69
4-6 days	5	9.62	9	17.31
7-9 days	2	3.85	12	23.08
≥10 days	2	3.85	9	17.31
Total	**18**	**34.63**	**34**	**65.39**

In the study conducted by Rozi et al (2021), it was stated that the factors affecting LOS or length of stay are: type of surgery, surgical wound infection, surgical complications, age, type of insurance, patient's occupation, and hospital administrative policies. LOS in fracture patients can be influenced by the type of bone fracture, the location of the bone fracture, as well as clinical conditions, complications, and comorbidities. In the elderly, comorbidities such as hypertension, diabetes mellitus, and pneumonia can affect the healing of fractures, causing a longer recovery time due to a decrease in bone mineral density (BMD). Fractures that occur in the upper extremities have a shorter hospital stay compared to fractures that occur in the lower extremities. This is because fractures of the lower extremities, such as the knee and lower leg, will limit the patient's movement, thus requiring a longer time to maintain bone mobilization. One of the postoperative complications is infection, which causes the surgical wound to heal more slowly, resulting in a longer duration of care for the patient (Rozi et al., 2021).

According to research conducted by Munawaroh et al (2014), the type of fracture can affect the length of hospital stay. The type of fracture affects the length of hospital stay for patients with hip fractures. The type of fracture can affect the length of hospital stay because both open and closed fractures are associated with the onset of infection due to the fracture, not because of surgical intervention. Generally, surgery for fractures is classified as clean surgery.

However, in open fractures, the type of surgery depends on the extent of tissue damage and the infection that occurs. This study also states that in the upper limbs, thighs, and light pelvic joints, the duration of surgery affects the length of treatment ($p<0.05$). In the case of mild knee and lower leg, the data could not be analyzed because all patients underwent surgery for 45-≤60 minutes. The duration of surgical delayed is significantly associated with the length of stay in the upper extremities, light knee and lower leg, thigh, and light hip joint ($p<0.05$). The waiting time for surgery can affect the Length of Stay (LOS); the longer the waiting time, the greater the LOS. The waiting time for surgery will be longer if the patient is admitted to the hospital on the eve of Friday, Saturday, and Sunday. This is due to the busyness leading up to the holidays, where examinations by doctors and supporting examinations are postponed until the working days (Munawaroh et al., 2014).

In another study, it was stated that nutritional status affects wound healing and the length of hospital stay post-surgery. Patients with poor nutritional status based on the nutritional risk index (NRI) will have a prolonged wound healing process, resulting in a longer length of stay (LOS) post-surgery (more than 7 days). In contrast, patients with good nutritional status based on the NRI will experience a faster wound healing process, leading to

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a shorter LOS post-surgery (≤ 7 days) (Susetyowati et al., 2010). So, the length of stay (LOS) cannot be determined solely by the type of analgesic received, but there are other factors involved.

IV. CONCLUSION

Based on the results of the research that has been conducted, it can be concluded that there is no significant difference in the analgesic effect of Ketorolac with Tramadol-Ketorolac combination based on pain level and *length of stay* (LOS) in patients with post-operative orthopedic pain at Trauma Center of Dr. M. Djamil Padang General Hospital (Period of January-March, 2023).

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